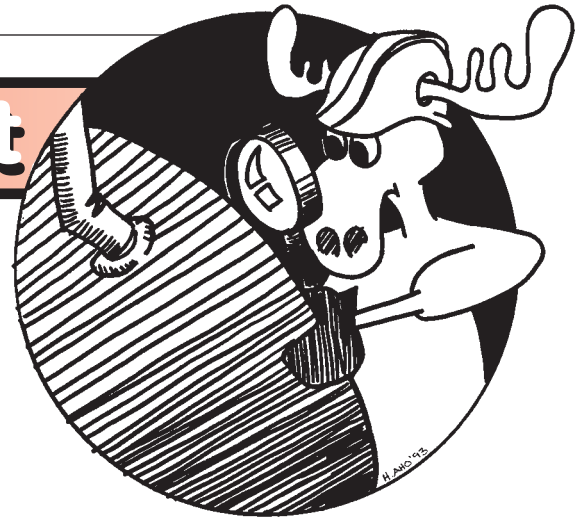


Tanks Down East

by W. David McCaskill

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Mending the Armor

Maine's Dispenser and Submersible-Pump Sump Study

The rolling landscape of farms, fields, and forests in rural mid-Maine was once the breadbasket of Boston. Some of the farms remain today, but the crosscut saws and horse teams have been replaced with chainsaws and skidders. And the old squeaky-floor general store with the small lunch counter is quickly being usurped by the modern convenience store, complete with drive-through and pick-up coffee, breakfast, sandwich, and pizza services. One such critter popped up on the landscape in rural Maine smack dab between a couple of homes with private wells. This installation took place a few years prior to Maine's UST siting law, when it was still legal to install gas tanks close to private drinking water wells. (See LUSTline #38, "There Ought to be a Law.") Less than a year later, the customers didn't have a choice between caffeinated or decaffeinated coffee, because the only thing being served was honest-to-goodness high-test!

During Maine DEP's investigation, the tanks and piping were found tight, and no product was found in the dispenser or tank containment sumps. But after the removal of about 9,000 yards of contaminated soil, we estimated that some 6,000 gallons of super had been released into the ground. The interstitial space of the double-walled flexible piping between the dispensers was full of water and gas, and the hottest soil reading was under the far super dispenser. We later found that the containment sump under this dispenser had a breach in the sump pen-

etration where a Stage II vapor-recovery line entered the bottom of the sump.

It seemed that gas had leaked from somewhere in the dispenser into and out of the dispenser containment sump and that some of the gas had become trapped in the double-walled piping between the dispensers. Product never made it to the tank-top piping sump, where it presumably would have been picked up by the leak-detection probe. As it was, the gasoline leaked out quicker than it could be detected. So it took bad coffee to announce that 6,000 gallons of super unleaded was missing.

The breach in our armor was that we did not address dispenser sumps in our rules and that aboveground components of the dispenser could leak and remain uncontained and undetected.

Well, after a \$1 million plus cleanup, we are still asking the owner for answers on how that much product slipped by...and for financial contributions to the cleanup cause.

Breach in the Armor

Since 1991, Maine has stalwartly relied on secondary containment with continuous leak detection as its sword and shield against leaks from

USTs. The breach in our armor was that we did not address dispenser sumps in our rules and that above-ground components of the dispenser could leak and remain uncontained and undetected.

Since the advent of flexible piping some 10 years ago, we have had a de facto dispenser containment sump requirement for all flexible piping, as the manufacturers require that all their fittings be housed in containment sumps. As illustrated in the opening story, using dispenser sumps without probes relies on product filling the dispenser sump up to a point where it can flow through the secondary piping back to the tank and then fill the tank sump to a level that trips the leak-detection probe—a kind of Rube Goldberg operation when you think of it!

Not too long ago, we decided it was time to make dispenser sumps with continuous monitoring a part of our UST armor. To provide solid data to support a rule change, we commissioned a study to answer the following questions:

- What level of contamination are we finding under dispensers and around submersible pumps?
- Which dispenser and submersible-pump components are leaking?

There had been two other such efforts elsewhere in the nation to assess the problem. The first was a survey by the Petroleum Equipment Institute (PEI) of 28 members operating in 45 states. (See LUSTline #41,

"PEI Members Weigh in on UST System Performance.") The second was an EPA-funded study titled *The Frequency and Extent of Dispenser Releases at Underground Storage Tank Facilities in South Carolina*. The PEI survey asked participants what they thought, based on their experience, they would see under dispensers and submersible pumps. The EPA-South Carolina study was based on an analysis of soil samples taken at tank removals.

In our study, Maine DEP hired a consultant to inspect 99 randomly selected active motor-fuel UST facilities throughout the state. The actual inspections were performed from May to November of 2002.

The percentage breakdown of the tank population studied was as follows:

- Retail facilities – 74 percent
- Commercial – 10 percent
- Government – 16 percent

With respect to piping systems, there were 143 pressure dispensers and 110 suction dispensers. Roughly half of these dispensers (124) had containment sumps, compared with 129 that did not. Of the 118 submersible pumps inspected, 99 had containment sumps and 19 did not.

Stains, Weeps, Drips

To quantify the magnitude of releases found during the study, we defined leaks from minor to major as stains, weeps, or drips. A "stain" was defined as a visible discoloration of a fuel-system component that was not wet to the touch and didn't cause product paste to turn color when applied. A "weep" was defined as a wet surface that caused product paste to turn color but did not produce any "drips" of product. Finally, a "drip" was defined as an observed droplet of product that would fall and reform when the pump was turned on.

So What Did We Find?

■ What is the level of contamination beneath dispensers?

Of the 124 dispenser sumps inspected, 72 percent were dry, 19 percent contained water, and 9 percent contained product. Almost all occurrences of liquids in the sumps were minor, with the product or water forming small puddles less than one inch deep. We sampled the soil under 124 dispensers without sumps using the Maine DEP bag

explain why the containment sumps seemed to be so much cleaner than the soil beneath the dispensers without containment.

■ Which dispenser components are leaking?

After inspecting 154 suction pumps, 448 filters, 814 meters, 445 unions, and 328 crash valves, we found very few smoking guns. Weeps were observed in 3 to 8 percent of components, and drips were observed in fewer than one percent of components. Staining, however, was observed in 6 to 13 percent of all the components, except for suction pumps, where staining was observed 21 percent of the time.

■ What is the level of contamination around submersible pumps?

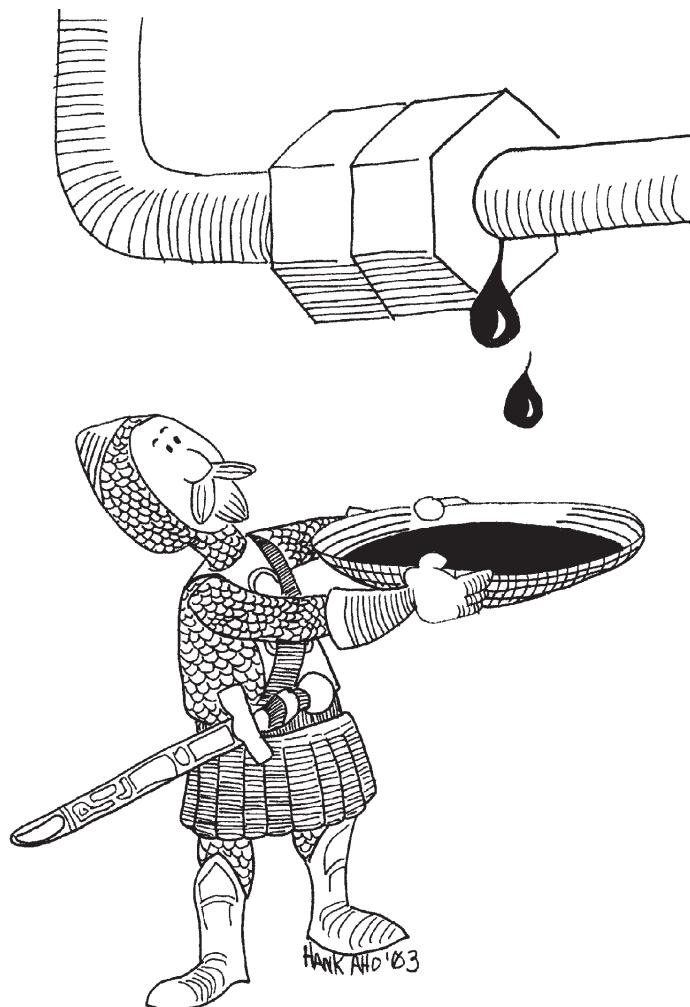
For submersible pumps, 57 percent of the sumps contained water—a few over 20 inches! Only 8 percent of submersible pump sumps contained product, and that was mostly in the form of small puddles in the corners and pockets of the sumps. The soil beneath 63 percent of the submersible pumps without containment sumps had contamination levels above 100 ppm tph; 32 percent had levels over 1,000 ppm.

With regard to the sources of this contamination, an inspection of 51 unions, 107 line-leak detectors, 107 functional elements, 598 pipe joints, and 22 flexible connectors revealed that virtually all

were clean. Again, there is this nagging paradox between the dearth of product in the sumps, the dearth of observed leaks, and the prevalence of contaminated soil beneath the submersible pumps.

Why? Why? Why?

With no real leaking guns we have come up with some theories:



head-space photoionization-detection protocol used during site assessments. (We were unable to collect samples under five of the dispensers due to access problems.)

We found that around half of the samples exceeded our existing 100 ppm total petroleum hydrocarbon (tph) level for reporting evidence of a leak, and over a quarter of the readings were over 1,000 ppm! We were left scratching our heads trying to

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■ Dirty Dirt?

During a meeting of tank owners concerning proposed changes to our UST rules, a claim was made that our study was flawed in that that it wasn't limited to sites where there had been no previous tanks. The theory put forward was that we could be seeing contaminated soil left over or returned to the excavation from a tank upgrade. This comment was made by a tank owner who had a site that was included in the study. In this case, the soil cleanup level was 500 ppm because the site was in an urban area served by public water. Soil samples taken under the dispensers during our study were found to be as high as 300 ppm.

So, could the contamination at some of these sites come from dirty dirt left over after the old tanks and piping came out? We looked through the data and found that of the 99 sites, 26 had never had tanks before, while the others had had non-conforming tanks removed and new ones installed.

Of the sites that had no containment sumps and that had never had tanks removed, 38 percent had soil contamination above the 100 ppm tph reporting level. Of the sites that had had previous tanks removed and had no containment sumps, 26 percent had soil contamination above 100 ppm. The data do not support the hypothesis that residual contamination is responsible for the high PID readings.

Furthermore, all of the samples taken during this study were shallow grab samples less than 12 inches deep. In almost all cases, the material sampled was sand or gravel backfill, not native soil. The above-mentioned site had fiberglass-reinforced plastic (FRP) piping, which requires specific backfill that can be assumed to be reasonably clean when installed. For this material to be contaminated by remaining or backfilled underlying contaminated soils, the water table would have to come all the way up to the surface to smear the contamination.

■ Messy Maintenance?

It is possible that we are just seeing contamination resulting from spills

during fuel-filter changes and other maintenance activities in the dispenser area. In fact, that did happen on the very first inspection of the study. Our consultant showed up at a convenience store next to a large shopping-mall parking lot and found more than 2,500 ppm tph in the soil beneath the dispensers. When the manager was informed of the finding, he explained that the Stage II vapor recovery testing contractor had just been there that morning and had to replace clogged fuel filters in order to complete the test.

And since we do have contamination under fuel dispensers (we just don't always know why), we've gone ahead and proposed changes to our UST rules to require dispenser sumps and monitoring under all new motor-fuel dispensers.

Changing the filter of an UST fuel system almost always results in spillage. The trick is for the technician to catch as much as possible with spill pans or sorbent material. Changing fuel filters was a common story/reason given for the high levels of dirty dirt found throughout the field inspections. What is interesting about the dispensers with containment sumps is that the majority of the sumps were dry and dusty. Does the presence of containment make filter changers more conscientious about spillage? Do sumps facilitate cleaning up the spillage? Or does the product evaporate away without a trace?

■ That Vapor Thing?

Could the soil contamination result from the migration of product vapors into porous backfill, such as crushed stone? This doesn't sound like a likely story, does it? But a comparison of contaminated soil types found under dispensers without sumps showed that 24 percent of sand, 71 percent of crushed stone, and 81 percent of finer-grain soils had contamination above 100 ppm.

■ Former Leaks?

Another hypothesis is that all the dirty dirt we saw was the result of former leaks that were fixed. Maine has a mandatory annual UST equipment inspection (for leak detection and spill and overfill equipment). So many drips happen but are caught and fixed sometime during the year before they can cause bigger problems.

Onward with Making the Mend

As you can see, I don't have any nice neat answers this time—only theories, at best. In fact, I would be happy for some input on this one. The complete study will soon be available at the Maine DEP Web site at www.state.me.us/dep/rwm/usts/index.htm.

And since we do have contamination under fuel dispensers (we just don't always know why), we've gone ahead and proposed changes to our UST rules to require dispenser sumps and monitoring under all new motor-fuel dispensers. Based on the contaminated soils found in the study, whether resulting from maintenance activities or the lack thereof, this change seems justified—it's the right thing to do!. We may also use these results to incorporate guidelines for inspecting dispensers into our existing annual tank inspection program.

What's next with containment sumps? Retrofitting of dispenser sumps at existing facilities? (A tough sell politically.) Routine testing for all sumps? We'll wait and see what California and the testing manufacturers do on this one. Meanwhile, between tweaking our UST rules and torturing ourselves for not doing more earlier, we continue to soothe our collective being with our mantra: Our best armor is our sensitive-area UST siting law, founded on the observation that the only UST that doesn't have a release is the one that was never built. ■